

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Withdrawn) A method of manufacturing a semiconductor device comprising the steps of:

adding a metallic element to a first semiconductor film having an amorphous structure;

crystallizing the first semiconductor film to form a first semiconductor film having a crystalline structure;

forming a barrier layer on a surface of the first semiconductor film having a crystalline structure;

forming a second semiconductor film on the barrier layer;

forming a third semiconductor film comprising a noble gas element on the second semiconductor film;

gettering the metallic element into the third semiconductor film to remove or reduce the amount of the metallic element within the first semiconductor film having a crystalline structure; and

removing the second semiconductor film and the third semiconductor film.

2. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the step of forming of the third semiconductor film comprises steps of forming a semiconductor film and adding a noble gas element to the semiconductor film.

3. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the step of forming of the third semiconductor film comprises a step of

forming a semiconductor film comprising a noble gas element by using plasma CVD or reduced pressure thermal CVD.

4. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the step of forming of the third semiconductor film comprises a step of forming a third semiconductor film comprising a noble gas element by using sputtering.

5. (Withdrawn) A method of manufacturing a semiconductor device according to claim 3, comprising the step of forming the third semiconductor film comprising a noble gas element and further adding a noble gas element to the third semiconductor film.

6. (Withdrawn) A method of manufacturing a semiconductor device according to claim 4, comprising the step of forming the third semiconductor film comprising a noble gas element and further adding a noble gas element to the third semiconductor film.

7. (Withdrawn) A method of manufacturing a semiconductor device according to claim 2, comprising the step of adding one element or a plurality of elements chosen from the group consisting of O, O₂, P, H, and H₂ in addition to the noble gas element.

8. (Withdrawn) A method of manufacturing a semiconductor device according to claim 5, comprising the step of adding one element or a plurality of elements chosen from the group consisting of O, O₂, P, H, and H₂ in addition to the noble gas element.

9. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the third semiconductor film is a semiconductor film having an amorphous structure or a crystalline structure.

10. (Previously Presented) A method of manufacturing a semiconductor device comprising the steps of:

adding a metallic element to a first semiconductor film having an amorphous structure;

crystallizing the first semiconductor film to form a first semiconductor film having a crystalline structure;

forming a barrier layer on a surface of the first semiconductor film having a crystalline structure;

forming a second semiconductor film on the barrier layer;

adding a noble gas element to a region of the second semiconductor film;

gettering the metallic element into the region of the second semiconductor film to remove or reduce the amount of the metallic element within the first semiconductor film having a crystalline structure; and

removing the second semiconductor film.

11. (Previously Presented) A method of manufacturing a semiconductor device according to claim 10, further comprising a step of adding one element or a plurality of elements chosen from the group consisting of O, O₂, P, H, and H₂ in addition to the noble gas element.

12. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the second semiconductor film is a semiconductor film having an amorphous structure or a crystalline structure.

13. (Original) A method of manufacturing a semiconductor device according to claim 10, wherein the second semiconductor film is a semiconductor film having an amorphous structure or a crystalline structure.

14. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the metallic element is one element or a plurality of elements chosen from the group consisting of Fe, Ni, Co, Ru, Rh, Pd, Os, Ir, Pt, Cu, and Au.

15. (Original) A method of manufacturing a semiconductor device according to claim 10, wherein the metallic element is one element or a plurality of elements chosen from the group consisting of Fe, Ni, Co, Ru, Rh, Pd, Os, Ir, Pt, Cu, and Au.

16. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the step of crystallizing the first semiconductor film is a heat treatment process.

17. (Original) A method of manufacturing a semiconductor device according to claim 10, wherein the step of crystallizing the first semiconductor film is a heat treatment process.

18. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the step of crystallizing the first semiconductor film is a process of irradiating strong light to the semiconductor film having an amorphous structure.

19. (Original) A method of manufacturing a semiconductor device according to claim 10, wherein the step of crystallizing the first semiconductor film is a process of irradiating strong light to the semiconductor film having an amorphous structure.

20. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the step of crystallizing the first semiconductor film is a heat treatment process and a process of irradiating strong light to the semiconductor film having an amorphous structure.

21. (Original) A method of manufacturing a semiconductor device according to claim 10, wherein the step of crystallizing the first semiconductor film is a heat treatment process and a process of irradiating strong light to the semiconductor film having an amorphous structure.

22. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the step of forming the barrier layer is a step of oxidizing a surface of the semiconductor film having a crystalline structure by using a solution containing ozone.

23. (Original) A method of manufacturing a semiconductor device according to claim 10, wherein the step of forming the barrier layer is a step of oxidizing a surface of the semiconductor film having a crystalline structure by using a solution containing ozone.

24. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the step of forming the barrier layer is a step of oxidizing a surface of the semiconductor film having a crystalline structure by irradiating ultraviolet light.

25. (Original) A method of manufacturing a semiconductor device according to claim 10, wherein the step of forming the barrier layer is a step of oxidizing a surface of the semiconductor film having a crystalline structure by irradiating ultraviolet light.

26. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the step of gettering is a heat treatment process.

27. (Original) A method of manufacturing a semiconductor device according to claim 10, wherein the step of gettering is a heat treatment process.

28. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the step of gettering is a process of irradiating strong light to the semiconductor film.

29. (Original) A method of manufacturing a semiconductor device according to claim 10, wherein the step of gettering is a process of irradiating strong light to the semiconductor film.

30. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the step of gettering is a heat treatment process and a process of irradiating strong light to the semiconductor film.

31. (Original) A method of manufacturing a semiconductor device according to claim 10, wherein the step of gettering is a heat treatment process and a process of irradiating strong light to the semiconductor film.

32. (Withdrawn) A method of manufacturing a semiconductor device according to claim 18, wherein the strong light is light emitted from a halogen lamp, a metal halide lamp, a xenon arc lamp, a carbon arc lamp, a high pressure sodium lamp, or a high pressure mercury lamp.

33. (Original) A method of manufacturing a semiconductor device according to claim 19, wherein the strong light is light emitted from a halogen lamp, a metal halide lamp, a xenon arc lamp, a carbon arc lamp, a high pressure sodium lamp, or a high pressure mercury lamp.

34. (Withdrawn) A method of manufacturing a semiconductor device according to claim 20, wherein the strong light is light emitted from a halogen lamp, a metal halide lamp, a xenon arc lamp, a carbon arc lamp, a high pressure sodium lamp, or a high pressure mercury lamp.

35. (Original) A method of manufacturing a semiconductor device according to claim 21, wherein the strong light is light emitted from a halogen lamp, a metal halide lamp, a xenon arc lamp, a carbon arc lamp, a high pressure sodium lamp, or a high pressure mercury lamp.

36. (Withdrawn) A method of manufacturing a semiconductor device according to claim 28, wherein the strong light is light emitted from a halogen lamp, a metal halide lamp, a xenon arc lamp, a carbon arc lamp, a high pressure sodium lamp, or a high pressure mercury lamp.

37. (Original) A method of manufacturing a semiconductor device according to claim 29, wherein the strong light is light emitted from a halogen lamp, a metal halide lamp, a xenon arc lamp, a carbon arc lamp, a high pressure sodium lamp, or a high pressure mercury lamp.

38. (Withdrawn) A method of manufacturing a semiconductor device according to claim 30, wherein the strong light is light emitted from a halogen lamp, a metal halide lamp, a xenon arc lamp, a carbon arc lamp, a high pressure sodium lamp, or a high pressure mercury lamp.

39. (Original) A method of manufacturing a semiconductor device according to claim 31, wherein the strong light is light emitted from a halogen lamp, a metal halide

lamp, a xenon arc lamp, a carbon arc lamp, a high pressure sodium lamp, or a high pressure mercury lamp.

40. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the noble gas element is one element or a plurality of elements chosen from the group consisting of He, Ne, Ar, Kr, and Xe.

41. (Previously Presented) A method of manufacturing a semiconductor device according to claim 10, wherein the noble gas element is one element or a plurality of elements chosen from the group consisting of He, Ne, Ar, Kr, and Xe.

42. (Withdrawn). A method of manufacturing a semiconductor device according to claim 1, wherein the third semiconductor film further comprises one element or a plurality of elements selected from the group consisting of O, O₂, P, H, and H₂.

43. (Previously Presented) A method of manufacturing a semiconductor device according to claim 10, wherein the second semiconductor film further comprises one element or a plurality of elements selected from the group consisting of O, O₂, P, H, and H₂.

44. (Withdrawn) A method of manufacturing a semiconductor device according to claim 1, wherein the third semiconductor film comprises a noble gas element at a concentration of 1×10^{19} to 1×10^{22} /cm³.

45. (Canceled)

46. (Withdrawn) A method of manufacturing a semiconductor device comprising:

forming a first semiconductor film having an amorphous structure over a substrate;

providing the first semiconductor film with a material for promoting crystallization;

heating the first semiconductor film for crystallizing;

irradiating the first semiconductor film with a laser light for improving crystallinity;

forming a barrier layer over the first semiconductor film having a crystalline structure;

forming a second semiconductor film over the barrier layer;

forming a third semiconductor film over the second semiconductor film, the third semiconductor film comprising a noble gas element;

gettering the material for promoting crystallization into the third semiconductor film.

47. (Previously Presented) A method of manufacturing a semiconductor device comprising:

forming a first semiconductor film having an amorphous structure over a substrate;

providing the first semiconductor film with a material for promoting crystallization;

heating the first semiconductor film for crystallizing;

irradiating the first semiconductor film with a laser light for improving crystallinity;

forming a barrier layer over the first semiconductor film having a crystalline structure;

forming a second semiconductor film over the barrier layer;

adding a noble gas element to a region of the second semiconductor film;

gettering the material for promoting crystallization into the region of the second semiconductor film.

48. (Withdrawn) A method of manufacturing a semiconductor device comprising:

forming a first semiconductor film having an amorphous structure over a substrate;

providing the first semiconductor film with a material for promoting crystallization;

heating the first semiconductor film for crystallizing;

irradiating the first semiconductor film with a laser light for improving crystallinity;

forming a second semiconductor film over the first semiconductor film;

forming a third semiconductor film over the second semiconductor film, the third semiconductor film comprising a noble gas element;

gettering the material for promoting crystallization into the third semiconductor film.

49. (Previously Presented) A method of manufacturing a semiconductor device comprising:

forming a first semiconductor film having an amorphous structure over a substrate;

providing the first semiconductor film with a material for promoting crystallization;

heating the first semiconductor film for crystallizing;

irradiating the first semiconductor film with a laser light for improving crystallinity;

forming a second semiconductor film over the first semiconductor film, the second semiconductor film comprising a noble gas element;

gettering the material for promoting crystallization into the second semiconductor film.

50. (Withdrawn) A method of manufacturing a semiconductor device according to claim 46, wherein the barrier layer is formed by oxidizing a surface of the first semiconductor film by using a solution containing ozone.

51. (Previously Presented) A method of manufacturing a semiconductor device according to claim 47, wherein the barrier layer is formed by oxidizing a surface of the first semiconductor film by using a solution containing ozone.

52. (Withdrawn) A method of manufacturing a semiconductor device according to claim 46, wherein the barrier layer is formed by oxidizing a surface of the first semiconductor film by irradiating ultraviolet light.

53. (Previously Presented) A method of manufacturing a semiconductor device according to claim 47, wherein the barrier layer is formed by oxidizing a surface of the first semiconductor film by irradiating ultraviolet light.

54. (Withdrawn) A method of manufacturing a semiconductor device according to claim 46, wherein the noble gas element is at least an element selected from the group consisting of He, Ne, Ar, Kr and Xe.

55. (Previously Presented) A method of manufacturing a semiconductor device according to claim 47, wherein the noble gas element is at least an element selected from the group consisting of He, Ne, Ar, Kr and Xe.

56. (Withdrawn) A method of manufacturing a semiconductor device according to claim 48, wherein the noble gas element is at least an element selected from the group consisting of He, Ne, Ar, Kr and Xe.

57. (Previously Presented) A method of manufacturing a semiconductor device according to claim 49, wherein the noble gas element is at least an element selected from the group consisting of He, Ne, Ar, Kr and Xe.

58. (Withdrawn) A method of manufacturing a semiconductor device according to claim 46, wherein the third semiconductor film comprises the noble gas element at a concentration of 1×10^{19} to 1×10^{22} /cm³.

59. (Canceled)

60. (Withdrawn) A method of manufacturing a semiconductor device according to claim 48, wherein the third semiconductor film comprises the noble gas element at a concentration of 1×10^{19} to 1×10^{22} /cm³.

61. (Canceled)

62. (Withdrawn – Currently Amended) A method of manufacturing a semiconductor device according to claim 46, wherein the semiconductor device is applied to an electronic apparatus selected from the group consisting of a personal computer, a video camera, a mobile computer, a goggle type display, a DVD player, a digital camera, a front type projector, a rear type projector, a mobile phone and an electronic book.

63. (Currently Amended) A method of manufacturing a semiconductor device according to claim 47, wherein the semiconductor device is applied to an electronic apparatus selected from the group consisting of a personal computer, a video camera, a mobile computer, a goggle type display, a DVD player, a digital camera, a front type projector, a rear type projector, a mobile phone and an electronic book.

64. (Withdrawn – Currently Amended) A method of manufacturing a semiconductor device according to claim 48, wherein the semiconductor device is

applied to an electronic apparatus selected from the group consisting of a personal computer, a video camera, a mobile computer, a goggle type display, a DVD player, a digital camera, a front type projector, a rear type projector, a mobile phone and an electronic book.

65. (Currently Amended) A method of manufacturing a semiconductor device according to claim 49, wherein the semiconductor device is applied to an electronic apparatus selected from the group consisting of a personal computer, a video camera, a mobile computer, a goggle type display, a DVD player, a digital camera, a front type projector, a rear type projector, a mobile phone and an electronic book.

66. (Withdrawn) A method of manufacturing a semiconductor device comprising:

- providing a crystalline semiconductor film comprising silicon over a substrate, said crystalline semiconductor film containing a metallic element;

- forming a barrier layer over the crystalline semiconductor film;

- forming a second semiconductor film over the barrier layer;

- forming a third semiconductor film comprising a noble gas element over the second semiconductor film;

- gettering the metallic element into the third semiconductor film to remove or reduce the amount of the metallic element within the crystalline semiconductor film; and

- removing the second semiconductor film and the third semiconductor film.

67. (Previously Presented) A method of manufacturing a semiconductor device comprising:

- providing a crystalline semiconductor film comprising silicon over a substrate, said crystalline semiconductor film containing a metallic element;

- forming a barrier layer over the crystalline semiconductor film;

forming a semiconductor film over the barrier layer;
adding a noble gas element to a region of the second semiconductor film;
gettering the metallic element into the region of the semiconductor film to remove or reduce the amount of the metallic element within the crystalline semiconductor film;
and
removing the semiconductor film.

68. (Withdrawn) A method of manufacturing a semiconductor device according to claim 66, wherein the barrier layer is formed by oxidizing a surface of the first semiconductor film by using a solution containing ozone.

69. (Previously Presented) A method of manufacturing a semiconductor device according to claim 67, wherein the barrier layer is formed by oxidizing a surface of the first semiconductor film by using a solution containing ozone.

70. (Withdrawn) A method of manufacturing a semiconductor device according to claim 66, wherein the barrier layer is formed by oxidizing a surface of the first semiconductor film by irradiating ultraviolet light.

71. (Previously Presented) A method of manufacturing a semiconductor device according to claim 67, wherein the barrier layer is formed by oxidizing a surface of the first semiconductor film by irradiating ultraviolet light.

72. (Withdrawn) A method of manufacturing a semiconductor device according to claim 66, wherein the noble gas element is at least an element selected from the group consisting of He, Ne, Ar, Kr and Xe.

73. (Previously Presented) A method of manufacturing a semiconductor device according to claim 67, wherein the noble gas element is at least an element selected from the group consisting of He, Ne, Ar, Kr and Xe.

74. (Withdrawn) A method of manufacturing a semiconductor device according to claim 66, wherein the third semiconductor film comprises the noble gas element at a concentration of 1×10^{19} to 1×10^{22} /cm³.

75. (Canceled)

76. (Withdrawn – Currently Amended) A method of manufacturing a semiconductor device according to claim 66, wherein the semiconductor device is applied to an electronic apparatus selected from the group consisting of a personal computer, a video camera, a mobile computer, a goggle type display, a DVD player, a digital camera, a front type projector, a rear type projector, a mobile phone and an electronic book.

77. (Currently Amended) A method of manufacturing a semiconductor device according to claim 67, wherein the semiconductor device is applied to an electronic apparatus selected from the group consisting of a personal computer, a video camera, a mobile computer, a goggle type display, a DVD player, a digital camera, a front type projector, a rear type projector, a mobile phone and an electronic book.

78. (Previously Presented) A method of manufacturing a semiconductor device comprising the steps of:

providing a crystalline semiconductor film comprising silicon over a substrate, said crystalline semiconductor film containing a metallic element;

forming a semiconductor film over the crystalline semiconductor film;

adding a noble gas element to a region of the semiconductor film;
gettering the metallic element into the semiconductor film to remove or reduce the amount of the metallic element within the crystalline semiconductor film.

79. (Previously Presented) A method of manufacturing a semiconductor device according to claim 78, wherein the noble gas element is added into an upper surface of the semiconductor film.

80. (Previously Presented) A method of manufacturing a semiconductor device according to claim 78, wherein the semiconductor film comprises a first region and a second region comprising a noble gas element on the first region.

81. (Previously Presented) A method of manufacturing a semiconductor device according to claim 10, wherein the metallic element moves to the region of the second semiconductor film in a direction perpendicular to the first semiconductor film.

82. (Previously Presented) A method of manufacturing a semiconductor device according to claim 47, wherein the metallic element moves to the region of the second semiconductor film in a direction perpendicular to the substrate.

83. (Previously Presented) A method of manufacturing a semiconductor device according to claim 49, wherein the metallic element moves to the second semiconductor film in a direction perpendicular to the substrate.

84. (Previously Presented) A method of manufacturing a semiconductor device according to claim 67, wherein the metallic element moves to the region of the semiconductor film in a direction perpendicular to the substrate.

85. (Previously Presented) A method of manufacturing a semiconductor device according to claim 78, wherein the metallic element moves to the region of the semiconductor film in a direction perpendicular to the substrate.